

WHAT IS CLAIMED:

1. An inter-vertebral implant, made of a radiation-permeable material having a substantially circular-shaped hollow body with a sleeve, the inter-vertebral implant defining a surface and comprising:

a front section, a back section, and two lateral sections defining a central axis, the hollow body being subdivided by at least two partitions, the at least two partitions running essentially parallel to the central axis and connecting the front section to the back section, wherein;

the surface of the bone implant has surface irregularities of at least about $2\text{ }\mu\text{m}$ and the at least two partitions have at least one perforation.

2. The bone implant of claim 1, wherein the partitions are trussed together by a cross strut.

3. The bone implant of claim 1, wherein the surface irregularities are smaller than about $10\text{ }\mu\text{m}$.

4. The bone implant of claim 1, wherein the perforations in each of the partitions have a minimum area of about 3.5 mm^2 .

5. The bone implant of claim 1, wherein each of the two lateral sections have at least one perforation having a minimum area of about 3.5 mm^2 .

6. The bone implant of claim 5, wherein the perforations of the two lateral sections are at least partially filled with an X-ray-opaque filler material.

7. The bone implant of claim 1, wherein the perforations of the partitions are at least partially filled with an X-ray-opaque filler material.

8. The bone implant of claim 1, wherein the radiation-permeable material is formed from at least one of the group selected from polyarylether ketone (PAEK), polytherimide (PEI), polyoxymethylene (POM), liquid-crystal polymer (LCP), polymethyl pentene (PMP), polysulfone (PSU), polyether sulfone (PESU or PES), polyethylene terephthalate (PETP), polymethyl methacrylate (PMMA), and ultra-high molecular polyethylene (UHMW-PE).

9. The bone implant of the claim 1, wherein the radiation-permeable material is strengthened with fibers, the fibers being at least one of the group selected from carbon fibers, glass fibers, and PEEK fibers.
10. The bone implant of claim 1 having a total volume, V , and the hollow body having a volume, v , and wherein the ratio of $V : v$ between the total volume V of the bone implant and the volume v of the hollow body ranges from about 1.9 to about 2.3.
11. The bone implant of claim 1, wherein at least a portion of the surface has an X-ray-transparent coating.
12. The bone implant of claim 1, wherein at least a portion of the surface has a thin coating having substantially no effect on the X-ray-transparency.
13. The bone implant of claim 12, wherein the coating is made of a metal, the metal selected from at least one of the group consisting of titanium, gold, and platinum.
14. The bone implant of claim 1, wherein the coating is made of a ceramic material, the ceramic material being hydroxyapatite or tricalcium phosphate.
15. The bone implant of claim 1, wherein the hollow body is at least partially filled with a filler material selected from at least one of the group consisting of calcium phosphate, hydroxyapatite, and tricalcium phosphate.
16. The bone implant of claim 1, wherein the hollow body is at least partially filled with a filler selected from at least one of the group consisting of calcium sulfate, demineralized bone, autologous bone, and coralline substances.
17. The bone implant of claim 1, wherein the hollow body is filled at least partially with a filler comprising a resorbable polymer.
18. The bone implant of claim 17, wherein the polymer is substantially porous.
19. A method of manufacturing the bone implant of claim 1, wherein the circular-shaped hollow body is manufactured by injection molding, hot forming, or hot pressing.

20. An inter-vertebral bone implant, made entirely or in part of a radiation-permeable material comprising a substantially circular-shaped hollow body with a sleeve, the inter-vertebral implant defining a surface and comprising:

a front section, a back section, and two lateral sections defining a central axis, the hollow body being subdivided by at least two partitions, the at least two partitions running essentially parallel to the central axis and connecting the front section to the back section, the at least two partitions trussed together by a cross strut, wherein;

the surface of the bone implant has surface irregularities of at least about $2\text{ }\mu\text{m}$; and the at least two partitions have at least one perforation.

21. The bone implant of claim 20, wherein the two lateral sections have at least one perforation.

22. The bone implant of claim 20, wherein the perforations have a minimum area of about 3.5 mm^2 .

23. The bone implant of the claim 20, wherein the radiation-permeable material is strengthened with fibers.

24. The bone implant of claim 20, wherein at least a portion of the surface has a substantially X-ray-transparent coating.

25. The bone implant of claim 20, wherein the hollow body is filled at least partially with a filler made entirely or in part of a resorbable polymer.

26. A bone implant, in particular an inter-vertebral implant, made entirely or in part of a radiation permeable material defining a surface, the implant comprising:

an outer sleeve defining a central chamber for receiving a filler material and configured for permitting new bone growth therethrough, the outer sleeve having a front section, a back section, and first and second lateral sections;

a first partition and a second partition, the first and second partitions connecting the front section to the back section so as to subdivide the central chamber, the first and second partitions spaced relative to one another and formed with the outer sleeve so as to define superior and inferior support areas for engaging and supporting endplates of adjacent inter-vertebral bodies;

a plurality of perforations in the outer sleeve and the first and second partitions, the perforations in communication with the central chamber for receiving and fixing the filler material with respect to the implant; and

wherein a cross brace is located between the first and second partitions for laterally supporting the first and second partitions and at least a portion of the surface has surface irregularities for fixation of the new bone growth.

27. The bone implant of claim 26, wherein the surface irregularities are at least about 2 μm .

28. The bone implant of claim 26, wherein the superior and inferior support areas define opposed convex profiles.

29. The bone implant of claim 28, wherein the superior and inferior support areas each have a first portion having pyramidal teeth for engaging an adjacent vertebral body and a second portion having surface irregularities between about 2 μm and about 10 μm .

30. The bone implant of claim 26, wherein the cross brace is located in the central chamber so as to be completely between the superior support area and the inferior support area.

31. The bone implant of claim 26, wherein a portion of the front section and a portion of the back section define parallel first and second walls, and a portion of the first lateral section and a portion of the second lateral section define parallel third and fourth walls, each of the first, second, third and fourth walls having perforations in communication with the central chamber.

32. The bone implant of claim 31, wherein the third and fourth parallel walls are substantially perpendicular to the first and second parallel walls.

33. The bone implant of claim 31, wherein the perforations of the partitions are substantially aligned with the perforations of the third and fourth walls.